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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : William A. Skinner et al.
Application No. : 09/603,857
Filed : June 26, 2000
For : DOUBLE FLANGED BUSHINGS AND INSTALLATION
METHODS

Examiner : Steven Blount
Art Unit : 2616
Docket No. : 320043.427

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF MARK R. WEISS

PURSUANT TO 37 CFR § 1.132

I, Mark R. Weiss, declare as follows:

1. I, Mark R. Weiss, am familiar with the subject matter disclosed and claimed in U.S. Patent Application No. 09/603,857 filed on June 26, 2000, and titled "Doubled Flanged Bushings and Installation Methods" ("the '857 Application").

2. I am Senior Engineering Applications Manager at Fatigue Technology, Inc., in Seattle, Washington, United States. Fatigue Technology, Inc. is the assignee of the '857 Application.

3. My educational and professional background includes: a Bachelor of Science in Mechanical Engineering (1987) from Washington State University and my professional experience of over 20 years in the Aerospace industry working with major aerospace companies such as Lockheed and Boeing developing, testing and implementing unique aircraft tooling and repairs.

4. I have reviewed the Office Action dated October 17, 2006, including the Examiner's rejections and cited U.S. Patent No. 3,252,493 to Smith ("the '493 patent").

5. I am one of the inventors of the '857 Application.

6. I am familiar with the 2-D axisymmetric finite element analysis ("FEA") model of the fastener of the '493 patent shown in Figure 1 below. Software sold by Abaqus, Inc. was used to simulate installation of the '493 fastener.

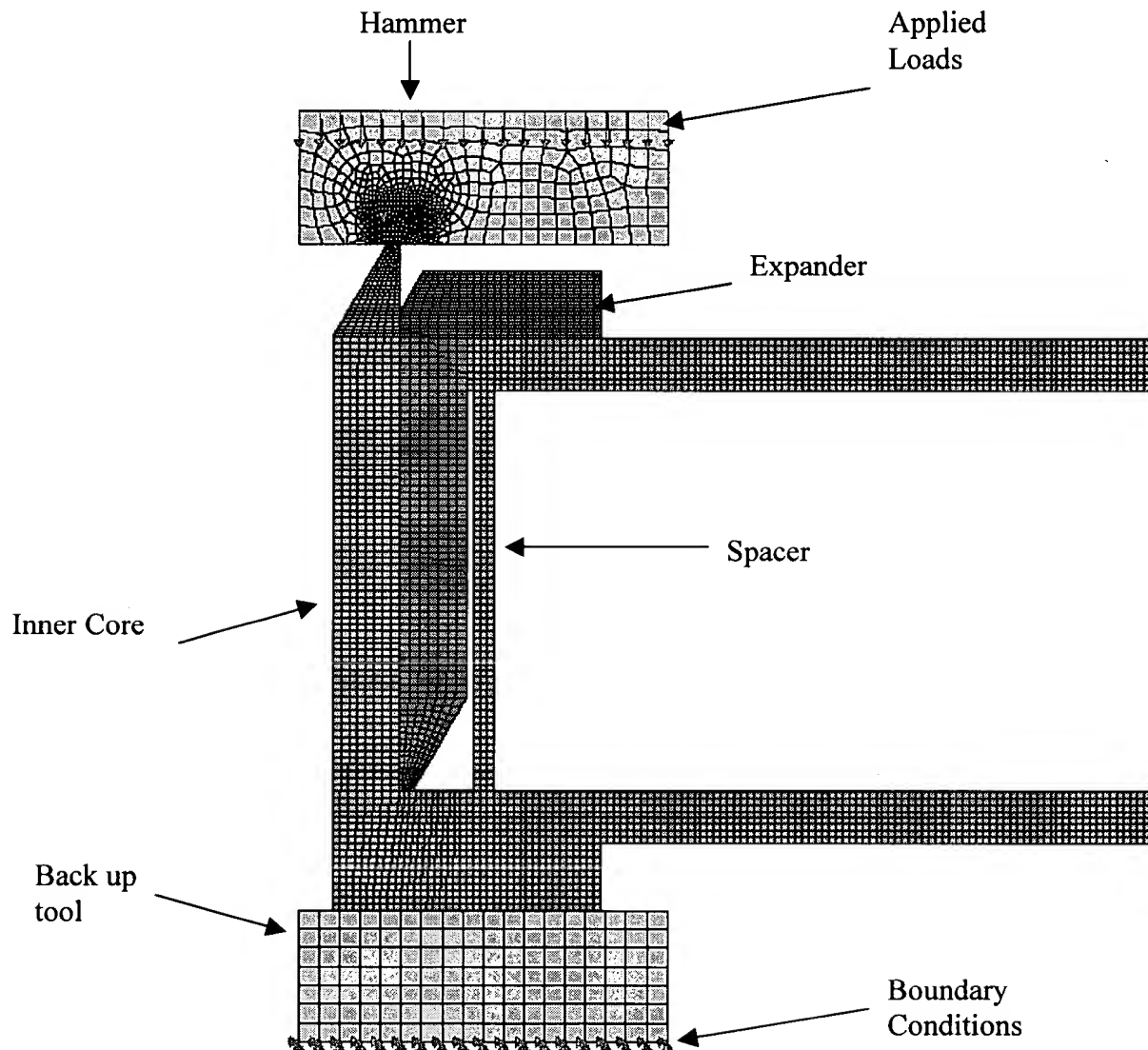


FIGURE 1 – MESHED MODEL OF THE '493

7. The model of Figure 1 includes an inner core, an expander, and a spacer. A hammer and back up tool are at opposing ends of the assembled metal fastener. The hammer and back up tool were meshed with elements having linear material properties, while the fastener was meshed with elements having non-linear material properties. As shown, the lowermost nodes of the meshed back up tool were fixed, and displacement was applied to the hammer.

8. Figures 2A and 2B below show the results obtained using the FEA model of Figure 1. Permanent deformation of the '493 fastener is highly localized at the end of the inner core spaced away from the parent structure. The expander retains its original shape. Figure 2B shows radial displacements of the metal inner core labeled for the Examiner's convenience.

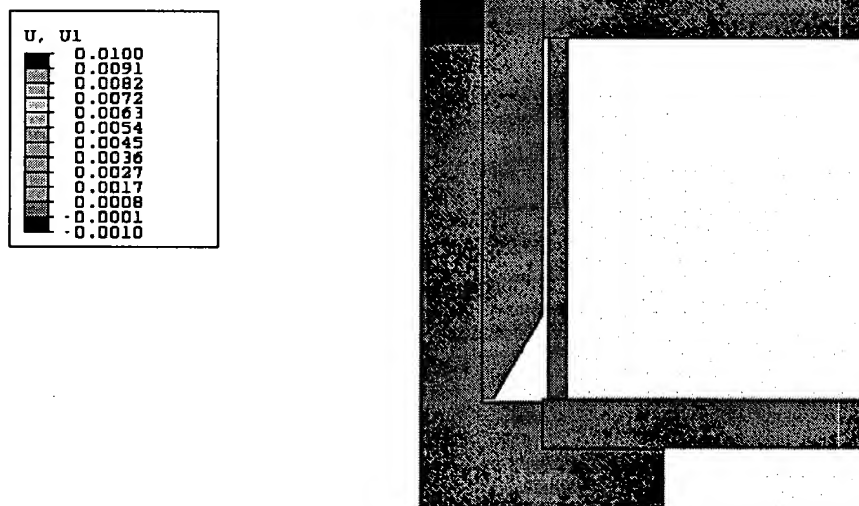


FIGURE 2A - RESULTS OF FEA ANALYSIS

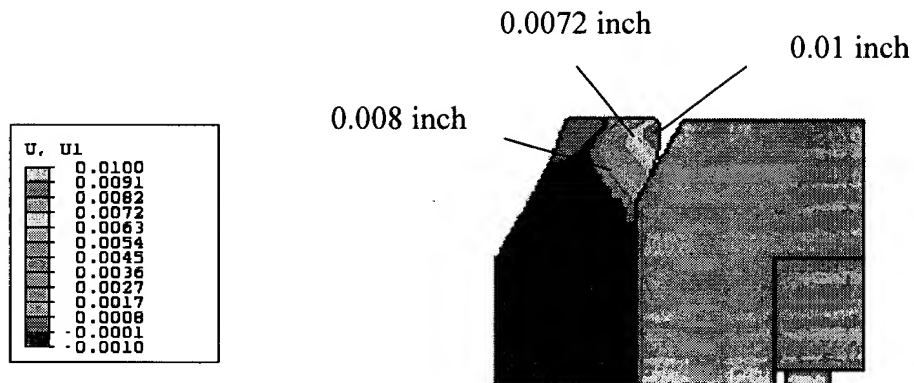


FIGURE 2B – DETAILED VIEW OF TIP OF INNER CORE

9. Figure 3 shows the hoop stresses in the '493 fastener. The hoop stresses are highly localized at the tip of the core. The expander does not experience substantially uniform stresses along its longitudinal length. The units in the legend of Figure 3 are (lb_f/in^2).

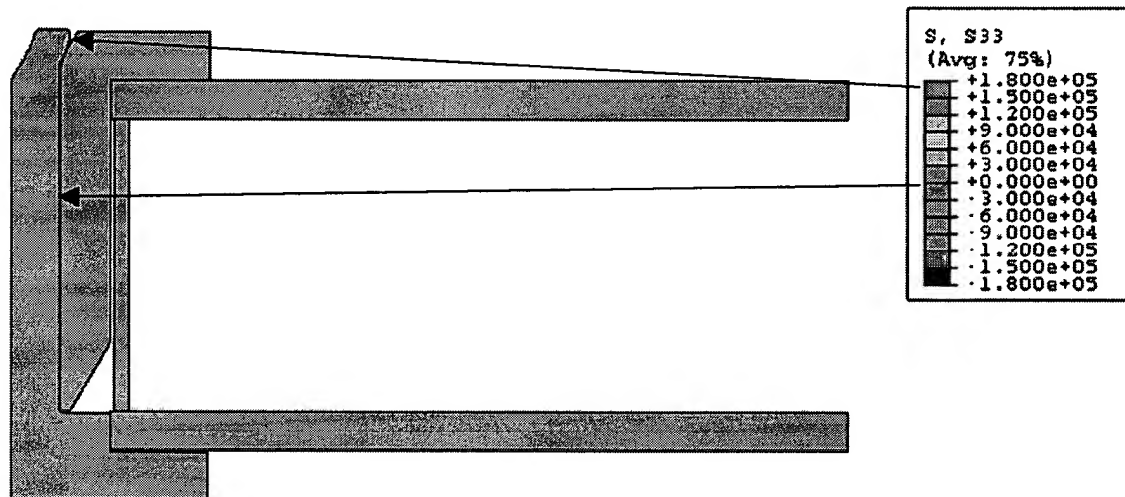



FIGURE 3 – HOOP STRESSES OF THE '493 FASTNER

I hereby declare that all statements made herein are, to my own knowledge, true and that all statements made on information or belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the captioned patent application or any patent issued therefrom.

4/12/07
Date


Mark R. Weiss

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